Stress Patterns in an Iraqi Arabic Variant: a Metrical Approach

Instructor Ammar A. Al Abdely

Universityof of Anbar
Education College for Women
Dept. of English

Abstract

The present study attempts to analyze stress patterns of Iraqi Arabic, particularly, Hity Arabic, an accent spoken in Hit town 175 k.m. to the south west of Baghdad. The study is specifically concerned with the assignment of primary stress at the word level within the recent manifestation of metrical approach outlined in Hayes (1995).According to metrical framework, stress is a hierarchy of rhythmic patterns in which one syllable scores relative prominence with relation to an adjacent one. Metrical stress theory assumes that generating the correct stress patterns should be done taking syllable quantity, foot inventory, directionality and extrametricallity into consideration. The study assumes that metrical approach succeeds in predicting both primary and secondary stress patterns in Iraqi Arabic in a straightforward fashion.

المستخلص

تحاول الدراسة تحليل أنماط النبر في لهجة هيت العراقية المستخدمة في مدينة هيت التي تبعد حوالي 175 كيلو مترا جنوب غرب العاصمة بغداد. تهتم الدراسة تحديدا بعملية تحديد موقع النبر الرئيسي على مستوى الكلمة وذلك في إطار النظرية المترية الحديثة الذي وضعها Hayes (1995). وفقا للنظرية المترية ، النبر هو بناء هرمي للأنماط الإيقاعية التي يكون فيها احد المقاطع بارزا نسبيا عن ما سبقه وتبعه من مقاطع.

تفترض النظرية المترية في النبر أن عملية الحصول على نمط النبر الصحيح يجب أن تتم من خلال اعتبار عوامل مهمة مثل ثقل المقطع و أنواع "الفوت" واتجاه بنائه إضافة إلى عامل "الاكسترامتريكاليتي" وهي عملية التغاضي عن صوت أو مقطع أو foot بأكمله عند عملية وضع النبر على المقطع. تفترض الدراسة أيضا أن النظرية المترية قد نجحت في تحديد أنماط النبر الرئيسي والثانوي في اللهجة موضوع الدراسة ولهجات عربية أخرى كنجاحها في ذلك عند تحليل أنماط النبر في اللغة الانجليزية بشكل دقيق وواضح.

1-Introduction

The study is an endeavor to examine the phonological aspects of stress patterns of an Iraqi variant spoken in a town called Hit, (HIA, henceforth) within the framework of metrical phonology outlined by Hayes (1995). The study will also refer to stress patterns of Standard English where necessary as this study is not intended to be a contrastive study of stress patterns in both Arabic and English.

The study will investigate the syllable patterns of lexical words of no more than four syllables to show their integral role in locating stress. The study will try to investigate the metrical structure in HIA as it is an essential step towards studying metrical stress patterns. The study will show the way primary stress is assigned to lexical words in

HIA. This will be done through parsing words into metrical feet represented in metrical grids.

The phenomenon of stress in Arabic has been the subject of some theoretical studies within the framework of linear and non-linear approaches like, Abdo(1969), Bram(1971,1973,1974), Johnson(1979). The present study is supposed to be different from the above mentioned ones as it adopts the metrical approach developed by Hayes (1995) and Roca and Johnson (1999). These two works refined and advanced pioneering works such as Liberman and Prince (1977). The two works use the bracketed metrical grid as an approach to present the prosodic structures pertinent to stress assignment.

That is what makes these two works more convenient and more accurate in dealing with stress. To the best of the researcher knowledge, no attempt has been made to investigate the concept of stress in Iraqi Arabic manipulating the recent manifestations of metrical theory. Examining the possible patterns of secondary stress can be accurately done employing the metrical approach, yet this will not be done here due to space limitation.

The findings of this study are supposed to be significant on both theoretical and pedagogical levels. With regard to the theoretical level, the study is expected to provide an empirical support to the idea of metrical theory universality which is able to account for stress assignment to standard as well as spoken variants. On the pedagogical level, the findings of this research would be useful at the educational and communicative levels. Educationally speaking, the research will positively influence the pronunciation of foreign learners in the sense of syllabifying words, producing stressed and unstressed syllables. Concerning the communicative level, it is expected that misunderstanding resulting from stress misplacement will be eliminated.

It is worth mentioning here that there is no formal grammar of neither Iraqi Arabic in general nor HIA in particular. Consequently the data recorded and analyzed in this study is collected from the spontaneous speech of people recorded on tapes in informal sessions. Subjects in this study are let to talk about topics of interest to them, such as their jobs, family, food, sports, marriage, policy, etc. Speech is then classified into monosyllabic, disyllabic, trisyllabic, and quadrisyllabic lexical words, which are classified according to syllable quantity to show their word patterns.

These patterns show heavy and light syllables which play a great role in deciding stress location. Metrical parameters of stress theory are applied to these patterns to obtain the sought results. 500 hundred lexical words are analyzed within the metrical framework to attain their basic patterns. It should be noted that a computerized program called Sound Forge Version 4.5 is used to analyze words into syllables.

Speakers of HIA are asked to pronounce words using a microphone connected to a computer, the results immediately appear on the computer screen. This program shows beyond any dispute whether HIA has consonant clusters on either phonetic or phonological level. It also shows vividly peaks and bases in syllables and makes it easier to decide on the number of syllables each word has. Phonetic symbols of Arabic in general and HIA in particular are listed below with illustrative examples:

1- /?/ /?ik.tib/ "اكتب" (write-imperative)
2- / 9/ /b9iid/ "بعيد " (far away)
3- /x/ / xaa.bar/ "خابر" (he called)
4- /G/ /Ga.riib/ "غريب" (stranger)
5-/T/ /Taa.Sa/ "طاسة" (bowel)
6- /D/ /Daa9/ "ضاع" (lost)
7- /S/ /?iS.bi9/ "اصبع" (finger)
8- /H/ /Ha.Tab/ "حطب" (firewood)
9- /Q/ /Qaal/ "قال" (he said)

Here follows some symbols frequently used in this study:
1- < > refers to extrametricality
2- /'/ refers to primary stress
3- --- refers to heavy syllables
4- == refers to super heavy syllables
5- ◡ refers to light syllables

2.Linear VS. Non-linear Approaches to Stress

Stress has always been a fertile subject for many scholars who have employed various approaches to deal with it. Al-Bay(2000:1) asserts that a review of the literature of stress "proves to have a confused history in the domain". If we go back to the thirties, we will read a definition of stress by Bloomfield(1933.10). He believes that stress is " intensity or loudness- consists of greater amplitude of sound waves." This definition which is based mainly on acoustic features was very influential and it spread amongst American structuralists in the forties and fifties. Jones(1950.134) adopts the same definition saying that stress is a " force of the utterance abstracted from the other attributes of speech sound."

Annabrah, stress in Arabic, was also considered by some linguists as Abn Manthour (1963) as an acoustic feature related to intensity, loudness, duration, frequency and vowel length (See Al Bay, 2001:1). This physical understanding of stress was prevalent for a long time, but it is now completely discredited. The famous book, The Sound Pattern of English (1968) by Chomsky and Halle, formalizes stress as a distinctive feature just like nasality.

The Sound Pattern of English(SPE, henceforth) lays the basis for liner phonology which presumes speech as a strict sequence of segments and boundaries. Abu Salim(1982.59) states that several studies of stress which are modeled on the SPE system of stress assignment "viewed stress as a feature[_+ stress] attached to segments as a result of applying the stress rules of the language to segmental strings." Syllables are disregarded within the SPE system and stress is assigned to vowels by English stress rules depending on certain factors like; distance from the right edge of the word and number of consonants following these vowels(see Al-Bay,2001.4-5).

Carr(1993:218) states that "primary stress, represented by '1', is assigned to the appropriate vowel in each lexical category by the English stress rules, which are sensitive to, among other things, syllable structure." Syllable structure according to SPE

is looked at as sequences of consonants and vowels. Rules of stress assignment mentioned above include nuclear stress rules which operate on the level of phrases and sentences. Compound stress rule is concerned with assigning stress to compounds. Carr(ibid) refers to a set of conventions that work in collaboration with stress rules like; stress subordination convention and the bracket erasure convention. The last one justifies the process of rule application cyclicity.

Several works that deal with stress assignment in various dialects of Arabic like; Abdo(1969), Bram(1971,1973,1974), Johnson(1979) and some others also view stress as a segmental feature rather than a matter of relative prominence relation defined among syllables rather than segments.

`It was the early years of the 70s that witnessed the assignment of stress to syllables rather than to segments. That means the beginning of non-linear approaches to stress like the auto-segmental and the metrical phonology. These non-linear approaches to stress challenge the SPE system via re-introducing the syllable as the carrier of stress. They emerge as a reaction to the drawbacks of non-linear approaches which analyze speech sounds as sequences of phonemes; vowels and consonants. They neglect the properties of speech which can not be associated with single segments like tone, intonation, rhythm, as well as stress.

Adopting the idea that stress assignment is sensitive to the structure of the syllable, Cruttenden (1986:16-20) , Crystal (1980:328) and Carr(1993: 214) classify languages into two types; languages that have stress on a fixed syllable and those that shift stress to different syllables. In the first type, stress is always assigned to a particular syllable; the antepenultimate, the penultimate, or the ultimate. Spanish, Welsh, and French are members of this group. Arabic and English, languages lying under the second type, assign stress according to the syllable structure of the word.

Auto-segmental phonology, presented by Firth(1966), is a comprehensive non-linear phonological theory which resides as stated by Clements(1994:2824-2825) in that " phonological representations are composed of several parallel, independent tiers of segments" . The main claim of the theory is proposed by Goldsmith(1976). His model shows that tones and segments are separated out onto tiers. The two tiers are linked to each other by associated lines which may not cross(see Al Bay, 2001: 7). Khan (1976) manipulates Goldsmith's model to re-introduce the syllable and since then the syllable has become the main domain of stress. The most influential post-SPE phonology is the metrical approach which provided a new system of stress assignment which depends on trees with labeled nodes. Describing this system in detail is the core of the next section.

3- What is Metrical Phonology?

Metrical phonology (MP henceforth), first introduced by Liberman(1975) and further developed by Liberman and Prince(1977) is considered as a refinement to previous studies which dealt with stress as a phonetic feature attached to individual segments. Frawley et al (2003:54-55) considers metrical phonology as a " family of sub-theories of generative phonology that are intended to characterize insightfully the properties of stress and stress rules." The basic claim of MP as stated by Abu Salim is that" stress is represented as a matter of relative prominence among syllables rather, than as a degree

of absolute prominence attached to each vowel in the underlying string." Relative here, simply means that a syllable is strong in relation to an adjacent weak one.

MP is concerned with organizing segments into groups of relative prominence. Defining prominence of a unit relative to other units in the same utterance is the innovative feature that metrical theory comes up with. According to MP, segments are organized into syllables, syllables into metrical feet, feet into phonological words, and words into larger units. Liberman and Prince(1977), believe that stress is a hierarchy of rhythmic units in which syllables are organized to construct feet and feet to construct words. The foot is a unit divided into two elements; the head which attracts the stress , while the second element is always less prominent and comes to the right of the head. The formation of foot will be dealt with in a later section of this study.

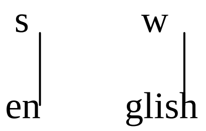
The hierarchal organization of metrical structures is formally represented in metrical tress and metrical grids. These hierarchically organized rhythmical structures, according to Liberman and Prince.1977, can account for the phonetic and phonological differences between stress and ordinary features, if they are used to represent stress. Metrical tress and grids will be explained in the following section.

3.1 Metrical Trees

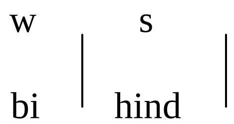
Linguistic prominence in metrical phonology is partially determined by the relations between nodes in a branching tree, by which one of the nodes is labeled as strong while the other nodes are labeled weak. A strong node is stronger than its weak sister node, so strong \weak feature is relative rather than an inherent phonetic realization. (see Hogg and McCully,1987:82).

A metrical tree ,according to Al-Bay(2001:8), consists of two syllables as strong-weak or weak-strong. A metrical tree is able to show relative prominence of each constituent via S\ W labels. A constituent with an S label has greater prominence than its sister constituent. Conversely, a constituent with a W label has less prominence than its sister constituent. Consider the following trees:

(1) English



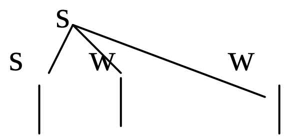
(b) behind

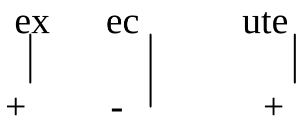


In the word "English", we have two syllables represented clearly in the tree above. The first is labeled (s, strong) as it is relatively stronger than its sister which is labeled (w, weak). The second word "behind" is also disyllabic with a relatively first weak syllable and a second strong one. The syllables labeled with an (s) mark are the ones normally attract the stress.

Bradley (1996: 6) states that the metrical trees are able to represent the internal metrical structure of words syllabically and to preserve the relative prominence between syllables in words that are multisyllabic. Consider the following example:

(2) execute



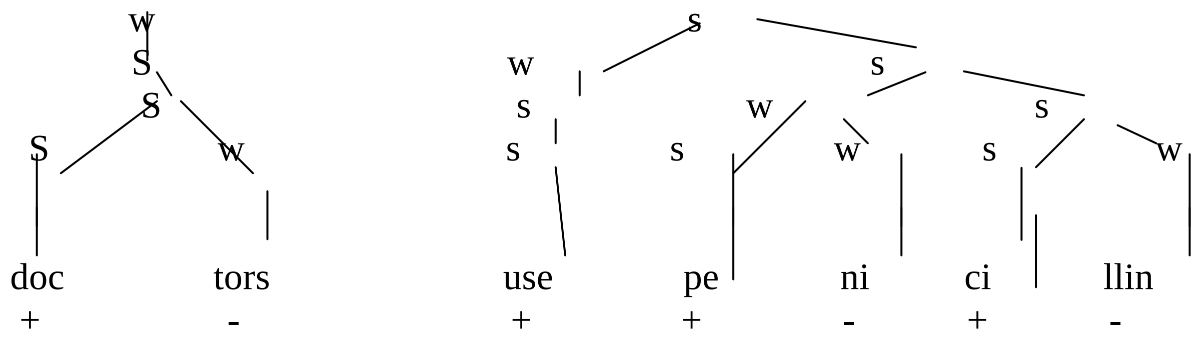


The word in (2) has three syllables, the first is the most prominent as it is labeled with (s) mark at all levels, while the third one ,which is also strong, is dominated by one s mark only. The first and the third syllables in (2) above are strong, yet the first is relatively more prominent than the third and it is ,thus, the one that receives primary stress.

Metrical trees have been made use of by Arab researchers when trying to analyze data of standard and spoken colloquial Arabic. Abu Salim, for example, is one among many who finds metrical phonology a highly successful approach to account for vowel shortening, vowel harmony, vowel epenthesis and most importantly stress placement in spoken variants of Arabic.

It is worth mentioning in this respect that metrical trees have been used also to account for phrase and sentence stress in an efficient way. The most prominent unit of a phrase or a sentence is the one dominated by (s) all the way up the tree. The phrase (doctors use penicillin) is represented in a metrical tree as follows:

(3)



The most prominent unit in (3) above is the syllable (ci) as it is dominated by (s) at all levels and does not have any weak nodes. Such a syllable is usually called the designated terminal element. Phrase and sentence stress assignment will not be dealt with in the present study as it is limited to stress assignment within words only.

Liberman and Prince(1977:249) put a set of rules that can be used to quite accurately assign stress to English words. Lexical Category Prominence Rule is one of these rules. It gives the label (weak) to the second node of the pair in the sister node. This rule does not apply if certain conditions are met, like the case when the node is branching or dominating a particular suffix and thus given the label (strong).

3.2 Metrical Grids

The Metrical grid is another way of representing the internal metrical structure of words, phrases and sentences hierarchically. Liberman and Prince(1977: 249) claim that metrical grids were originally developed to account for a phenomenon that appears in some languages including English, in which stress shifts to avoid stress clash. A stress clash may occur when two stressed syllables are so close to each other.

Hogg and McCully (1987: 131) claim that the metrical grid represents information related to stress in a novel way. They also present a complete account of grid levels. Grid marks, stars, asterisks or Xs, stand next to each other in their respective columns.

Kager (1995:5) refers to the vertical and horizontal dimensions of a grid stating that a grid represents relative prominence vertically and rhythm horizontally. This is not attainable when using metrical trees as they do not indicate rhythmic beats. He further comments that "rhythm representation is essential in the description of word stress patterns.". In the grid, Frawley et al (2003:55) illustrates, "the height of each column indicates the stress level of syllable at its base." The higher the column is, the stronger the syllable will be. The following example illustrates the vertical and horizontal dimensions of a grid:

```
(4)  Line 2                                        *                 *
     Line 1    *                   *          *    *                 *    *
     Line 0    *    *            *  *         *  *  *  *           *  *  *  *
            Mango             reduce        horizontal          phonology
```

Michaelmas (2007:2) comments on the above metrical grids saying that asterisks on line 0 mark each potentially stress-bearing unit. Stressed syllables have another asterisk on line 1, while syllables with another asterisk on line 2 are those with a primary stress. Consequently syllables with asterisks on line 1 only have secondary stress. Here follows another grid that shows how grids can indicate rhythmic beats:

```
(5) Line 2                                      *
    Line 1           *                   ------*     *
    Line 0        *    *                 *    *     *    *
               Heathrow                Heathrow Airport
```

It is clear that primary stress shifts from the second syllable in (Heathrow) to be a secondary stress on the first syllable when the word (airport) is attached to the word (Heathrow). This is a good example that shows how metrical grids can account for stress clash by shifting stress position as well as representing rhythmic beats in a certain utterance.

Generally speaking, metrical theory accounts for stress within a parametric framework as it is highly constrained and capable of describing language system depending on a limited set of rules. (see Hayes, 1995:55) The main idea of metrical approach is that stress is assigned to metrical feet, a concept that will be explained later in this paper, and these feet are represented by two main formalisms, trees and grids.

Al-Bay(2000:8) states that comparatively new studies in the field of metrical phonology have shown that" metrical grids are more adequate to reflect the rhythmic patterns of stress." , so these studies prefer to deal with stress patterns in different languages utilizing metrical grids rather than metrical trees.

3.3 Metrical Parameters

It is outlined earlier that within the metrical approach stress is no longer a phonetic feature that is assigned to a certain phoneme, or more specifically a vowel, rather it

introduces a hierarchically organized structure, which organizes segments into syllables and syllables into metrical feet.

Davenport and Durham (1998: 149) state that the foot was first recognized in traditional studies of poetic meter as an organizing structure for combing syllables, or more specifically, stressed and unstressed syllables. A stressed syllable associated with an unstressed one comprises a foot. Pearl (2009:202) identifies that " Stress assignment relies on both syllable weight and the formation of the units larger than syllables called metrical feet." Many other researchers like; Hayes(1981), Hogg and McCully (1987), Roca and Johnson (1999) Carr (1999) agree with Pearl that stress assignment is best accounted for by referring to metrical feet.

There are five parameters that are essential to the study of stress assignment from a metrical approach. These were introduced by Hayes(1995) for simplicity sake and for laying constraints upon languages or dialects under investigation. These parameters are explained now in general, then they will be dealt with them with reference to HIA in particular.

First, the stressed syllable is the head of the foot since it is the most prominent. Feet may be left headed with the stressed syllable on the left or right headed with the stressed syllable on the right as in the following example:

(6) {a} binary left headed {b} binary right headed



Second, Feet may be binary, bounded, consisting of two syllables or unbounded consisting of all the syllables in a particular domain, while a degenerate foot is a foot of one syllable only. Consider the following example:

(7) {a} unbounded right headed foot {b} degenerate foot



Third, Languages are either quantity sensitive or insensitive with respect to stress assignment. Languages that are quantity sensitive assign stress to a heavy syllable. A heavy syllable , according to Roach (2000:98), " either has a syllable peak which is a long vowel or diphthong, *or* a vowel followed by a coda." Weak syllables, Roach continues, "have a syllable peak which is a short vowel, and no coda unless the syllable peak is the schwa vowel ------- or I." Quantity insensitive languages disregard syllable weight when assigning stress to words.

Fourth, another parameter of stress assignment within metrical phonology is directionality. According to Hayes (1985) words are parsed into feet starting either from the right edge to the beginning or the other way around from the left to the right. This is noticeable when an odd number of syllables is found in a word. English, for example, parse words into feet from left to right.

Fifth, Extrametricallity, the last parameter considered here, is a sub-theory of metrical phonology which regards a certain syllable as being invisible at that time of applying phonological rules(Hayes.1995:57). In languages with Extrametricallity, an extrametrical syllable, whether a leftmost or a rightmost, is not included in the metrical foot, so it does not receive stress even if it is heavy. Languages without Extrametricallity, Pearl (2009:203) explains," include all syllables in metrical feet".

Extrametricallity is used to arrive at the correct stress pattern that words have in reality. It was found that making the final constituent of a word transparent to the rules will lead to the correct stress pattern. Al-Bay (2000:80) states that it is not only the last consonant that might be extrametrical, a whole syllable and sometimes a whole foot might be too.

4- Foot construction

It is time now to identify the foot and how it is constructed for purposes of stress placement. According to Davenport and Durham (1998:149), the foot is an "organizing structure for combining syllables, or more precisely for combining stressed and unstressed syllables." A stressed syllable is combined to an unstressed to form a foot for which the stressed one is usually the head.

Within MP, Hayes (1995:62) suggests, stress is assigned by forming a layer of feet across a word. Within a word, Oostendorp (2005:1) claims, "one of the feet usually stands out: it assigns main stress". The number of feet required to assign stress in languages with bounded stress is limited to three types: syllabic trochee, moraic trochee and moraic iamb. Kager (1995:6) states that "there is a small universal inventory of foot types, and languages can only select types from this inventory." We may have languages for which there is no evidence for metrical feet, as they do not show how a certain syllable is systematically stronger than its phonological neighbors. A language which do have metrical feet chooses either iambic or trochaic feet. Mixing these two foot types is not permitted in one language (see Oostendorp,2005:2).

Al Bay (2001:72-74) provides a summary of these types. The classification of feet into the three types mentioned above is based on two fundamental laws of alternating rhythm: trochaic or iambic. Trochee, as the term suggests, is made up of maximally two syllables with prominence on the first. While an iamb is a foot that consists of an unstressed syllable followed by a stressed one, thus the second syllable is the most prominent one. These two English words show these types respectively: "father / fa:. ð∂/ and about /∂. baut/". Oostendorp(2005:2) indicates that " Iambic and Trochaic feet are the most important building blocks in the stress systems of most stress languages too."

Disyllabic trochee is the one that shows prominence on the first syllable, while a syllabic trochee is the one that shows indifference of feet to syllable quantity. It means that the feet are built on counting syllables regardless of their weight i.e. any two syllables are grouped together to make a feet. Moraic feet, on the other hand are quantity sensitive, as we no longer refer to the syllable but to units of weight called moras. A mora, according to Zec (1995:149), cited in Al-Abdely (2002:114), "is a sub-syllabic constituent aligned to segments in the rhyme projection. The mora is used to indicate syllable weight". A light syllable will construct one mora, while a heavy

syllable will construct two. The mora will be used to parse words of four syllables into feet.

Moraic feet are either left headed or right headed both containing maximally two moras. Moraic trochee are left-headed while moraic iamb are right-headed. This is illustrated in the following diagrams:

(8) Syllabic Trochee ( ) Moraic Trochee ( ) Moraic Iamb
(x .) (. x) (. x)
(σ σ) (μ μ) (μ μ)

The symbols (x) and (.) in (8) refer to strong and light feet respectively.

Feet construction, feet directionality, feet directionality and extrametricality are discussed in the following sections of this study with regard to HIA. We will try to identify types of feet employed in HIA. We will also try to discover whether feet in HIA are bounded or not, whether feet counting direction is from left to right or from right to left, and whether extrametrical feet are found in HIA or not. But before that let us see whether HIA is quantity sensitive or not.

5- Metrical Primary Stress Patterns In Hity Iraqi Arabic

5-1 Quantity Sensitivity

It is illustrated earlier that languages are either sensitive or insensitive to syllable quantity. According to Abu Salim(1982:73), In quantity insensitive languages, the distinction between heavy and light syllables is invisible, since heavy and light syllables are counted alike. Pearl (2009:202) claims that syllables in a quantity insensitive language are "undifferentiated" and all syllables "are represented by the undifferentiated syllable class 'S' in a QI analysis" The stress rules in a quantity insensitive language are formed without reference to syllable weight distinction. French is an example of a quantity insensitive language.

Quantity sensitive languages are those that determine stress location depending on the property of syllable weight. Syllables in such languages are divided into heavy Vs light syllables. Where heavy syllables are the ones that have branching rhymes, light syllables, on the other hand are the ones that have a non-branching rhymes. Heavy syllables usually attract stress unless they are regarded extrametrical (a concept to be further explained in a later section). German, English as well as Arabic are all examples of quantity sensitive languages.

HIA is like all variants of Arabic which rely heavily on syllable weight in determining stress location on the word level. HIA, according to Al Abdely (2002: 105-106), shows six syllable types exemplified and described in the table below:

Syllable	Structure	Example	Meaning	Description
1-	CV	ma-ra	"Woman"	Short, open
2-	CVV	9aa-lam	"World"	Medium, open
3-	CVC	rik-ba	"Knee"	Medium, open
4-	CVCC	Saff	"Class"	Long, closed
5-	CVVC	raaH	"He went"	Long, closed
6-	CVVCC	maarr	"Passed by"	Long, closed

On the phonetic level, other five syllable types are also possible in HIA. These are; CCV, CCVV, CCVC, CCVVC, and CCVCC as in the words / ʃla-9a/ "he pulled it out", /blaa-yis/ "pliers", /trag-ga9/ "it was patched", /kϴiir/ "much" respectively.

For purposes of stress assignment, syllables in HIA are divided into three types; light, heavy and super-heavy. These are illustrated below:

(A) Light	1- CV	ra.d3a9	"he came back"
(B) Heavy	1- CVV	qaa.9id	"sitting"
	2- CVC	mad.ra.sa	"school"
(C) Super-heavy	1- CVVC	Ta.ri:k	"road"
	2- CVCC	Saff	"class"
	3- CVVCC	Ha:rr	"hot"

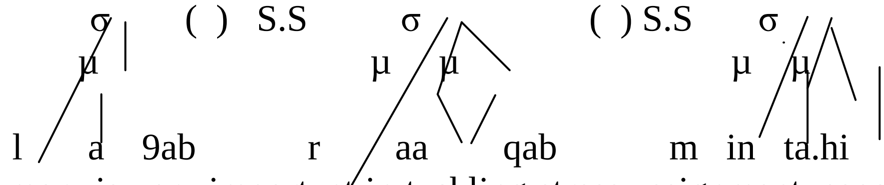
Other types of syllables possible at the phonetic level are not important to our discussion here, as they differ from the listed above types in the structure of the onset only. Cited in Abu-Salim(1982:73) and in Al-Bay(2001:65), Newman (1987), Halle &Vergnaud (1979), McCarthy(1979), Hayes (1995)and Zec (1995) all agree that the onset is completely irrelevant to the process of stress placement in all Arabic variants as well as English and the structure of the rhyme is what matters in this process.

Besides the quantity of the syllable, the position of the syllable is also important in locating the stress in HIA. Due to the analysis of the data collected in this study ,rules of stress assignment in HIA can be formulated taking into account the weight of the syllable and its position in the word. Hence we have the following rules:

1- Locate stress on the last syllable only if it is super-heavy / bis.'taan/ (orchard).
2- Locate stress on the penultimate syllable if it is heavy / tu.'faa.Ha/ (an apple)
3- Locate stress on the antepenultimate if both the final and the penultimate are light /' ka.ta.ba / (he wrote it)
4- stress may not retract beyond the antepenultimate.

In most languages that exhibit syllable weight distinction, a sub-syllabic constituent called mora is used to indicate the quantity of the syllable. Within a moraic theory of stress, a light syllable is usually assigned one mora, while heavy syllables usually take two. A syllable with a short vowel in a CV syllable is capable of projecting a mora, while syllables with branching rhymes are linked to two moras as seen below (L.S is a light syllable and a S.S is a strong syllable):

(9) L.S



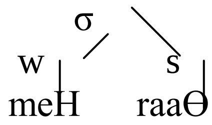
The use of the mora is very important in tackling stress assignment, especially when dealing with quadric-syllabic words. The second section introduces the foot as a structure above the syllable and how it helps in placing stress on correct syllables.

5-2 Feet Boundedness

Languages vary with regard to the number of syllables that can be directly dominated by the foot. Languages with bounded feet permit not more than two elements i.e. two

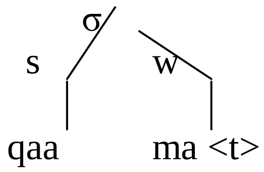
syllables or sub-syllables (moras) to be directly dominated under a feet node. Whereas languages with unbounded feet incorporate more than one unstressed syllable with the head stressed one. With regard to HIA, the structure of the foot in words with ultimate or penultimate stress is maximally binary. In words with antepenultimate or pre-antepenultimate stress, the stress foot is maximally ternary rather than unbounded. In words where the last syllable, the ultimate, is stressed a binary foot is usually structured in HIA. Consider the following example:

(10) /meH.raaΘ/ (plow)



The word / 'qaa.mat/ (she stood up), represents a binary foot that shows stress on the first element according to the rule above. The word is diagramed below:

(11) 'qaa.mat (she stood up)



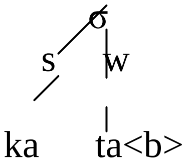
Similar examples in the corpus analyzed in this study show the same stress location when the foot is binary. Degenerate feet are not found in HIA.

5-3 Feet Directionality

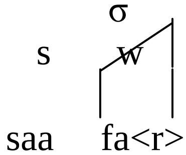
It is certain that languages differ in the direction they start parsing feet from. According to Hayes (1995), parsing words into feet either starts from the right edge of the word towards its beginning, from right to left, or the other way round, from left to right. HIA starts parsing feet from the left to the right. Some other Arabic variants like Palestinian behave the same way (Abu-Salim, 1982: 72).

HIA is no exception as it also starts counting stress from right to left for purposes of stress assignment. HIA is left branching where feet are parsed towards the left. The following examples will illustrate the case:

(12) 'ka.tab (He wrote)



(13) 'saa. far (he travelled)



These disyllabic words are made of one foot each as the metrical trees above illustrate, and the two show stress on the first element as the second is not super heavy. Thus stress is assigned from the right edge of the word i.e. the last syllable is considered first, then it does not attract the stress in the above examples as it is not super heavy, stress goes to the first syllable.

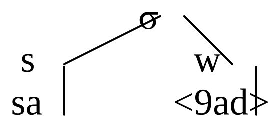
5-4 Extrametricallity

Hogg and McCully (1987:106) state that the term extrametricality " has been proposed by Bruce Hayes. Both in his doctoral thesis (Hayes 1981) and in his article 'Extrametricality and English stress' (Hayes 1982)." The term extrametricality simply means that certain segments do not count for purposes of assigning metrical structure, so they are ignored when applying the rules of stress assignment.

Abu-Salim (1982:75) refers to extrametricality as a way to explain the exceptional behavior of certain syllables in certain cases where these syllables are either heavy or super heavy, yet they do not receive stress. This is not acceptable in stress quantity sensitive languages like English and Arabic. Al-Bay (2001:78) further mentions the two restrictions on the implementation of extrametricality imposed by Hayes (1995) that "only a consonant, syllable, foot, or a word may be designated as extrametrical" and " a constituent may be extrametrical when located at a particular edge(left/right)of its domain".

HIA, a quantity sensitive language, usually assigns stress to heavy syllables, but that is not always the case as there are some exceptional cases. We said earlier that in HIA counting stress starts from right to left and the first heavy or super heavy syllable to the right of the word is the one to be stressed, yet this rule is not always respected. The corpus analyzed ,using the sound forge system, shows heavy final syllables (CVC) which are not stressed. Consider the following:

(14) /'Sa.9ad/ (he ascended)



It is noticed here that ,though the final syllable is heavy with the structure CVC ,it is not stressed. The final syllable is marked as extrametrical, then the foot is erected on the rime projection of the remaining syllable. After that the final syllable is rejoined as a weak member of the preceding syllable (Abu-Salim, 1982:75-76). This can not be accounted for by the stress assignment rules of HIA, but explained from a an extrametrical point of view where the last heavy syllable is not regarded when applying stress rules i.e. it is considered extrametrical. The right edge is chosen to be unmarked for extrametricality as HIA, like most Arabic dialects, does not go far from the right end of the word.

The same rule is employed in HIA to deal with heavy CVCC and CVVC in final position. It was stated earlier that final super heavy syllables always attract the stress, yet we find cases where this rule is not considered. The word /ba.naat/ (girls) with a the final super heavy syllable CVVC is stressed on the first light syllable. The word /ba.naat/ is supposed to be stressed on the last syllable.

The word will have the stress pattern /'ba.naat/ in spite of the fact that the second syllable is super heavy. Several approaches have been proposed to resolve this asymmetric behavior of super heavy syllables. Broselow (1976), Aoun (1979), McCarthy (1980), Abu-Salim (1982), and Hayes (1982). Abu-Salim (1982:82) believes that " final nodes in the metrical structure are marked as extrametrical ….. (and) that

heavy syllables (CVV and CVC) are phonetically equivalent for purposes of metrical structure assignment" . Following Abu-Salim, a reduction rule is needed where final super heavy and heavy syllables are reduced to heavy and light syllables for purposes of metrical structuring and consequently stress assignment.

Hayes (1982:238) provides a different proposal by which super heavy CVVC and CVCC are converted into CVV and CVC by the exclusion of the final C. The final C is unaffiliated at the initial stage of syllabification, but it is rejoined to the syllable at a later stage, namely after stress assignment. Extrametricality, according to Al-Bay (2001), "is available on two levels: segmental and prosodic levels." On the segmental level, a consonant might be extrametrical and on the prosodic level, a syllable or a foot can also be extrametrical.

6- Primary Stress Assignment

The metrical framework sketched in the previous sections of this study, is now employed to account for the patterns of primary stress in HIA lexical words aiming at predicting stress location from the phonetic structure. But before doing so, stress generalizations of HIA must be presented. They are the following:

1- The final syllable is stressed if it is super heavy:

(16) / ka.'riim/ (generous)
/ ma.'laak/ (angle)

2- Otherwise, stress the penultimate if it is heavy:

(17) / mik.'naa.sa/ (broom)
/mis.'saa.ha/ (eraser)

3- Otherwise, stress the antepenultimate:

(18) / 'mak.ta.bu/ (his office)
/ 'daf.ta.ru/ (his copybook)

Now let us apply these stress generalizations to HIA lexical words of various complexity to show whether these generalization are able to predict primary stress location or not.

6-1 Monosyllabic Lexical Words

Monosyllabic lexical words in HIA may be realized in the following syllable types:

1- CVVC /naar/ (fire)
/biir/ (well)
2- CVCC /marr/ (he passed by)
/bint/ (girl)

It is worth mentioning here that CVCC type is not very frequent in HIA where an epenthetic vowel is usually inserted between the two consonants of the final cluster CC. Various vowels may be used to avoid final clusters in HIA creating disyllabic words instead of mono ones. This is applied only when the two consonants are not identical. Final clusters of two identical consonants are left without epenthesis. Here are some examples:

(19) final two identical consonant clusters:
/dubb/ (bear)
/laff/ (he wrapped)

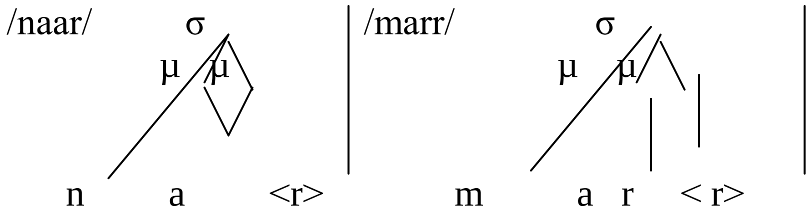
(20) final two non-identical consonant clusters with epenthesis:
/ga.bur/ (grave) instead of /gabr/
/da.ruf/ (envelope) instead of /darf/

On the phonetic level, monosyllabic words in HIA may be also realized in syllables with initial clusters of two consonants where a vowel has been deleted to create CCV, CCVV, CCVC, CCVVC and CCVCC. Yet these syllable types are irrelevant to the process of stress assignment as the cluster is under the onset node. It can be deduced from the examples in (19) and (20) that HIA disfavors final clusters but favors initial ones. That makes this variant of Iraqi Arabic different from other variants.

Degenerate foot, sub-minimal forms of a moraic foot, is not possible in HIA as these light syllables like CV is not capable of constructing a foot.

in other variants of Arabic like Palestinian Arabic (see Al-Bay, 2001:85). The words in 1 and 2 above are accounted for by applying metrical rules as follows:

(21)



Following Kenstowicz (1986) and Hayes (1995), the last consonant in a super heavy syllable is treaded as extrametrical at the level of syllabification. Consequently the last consonants in the words /narr/ and /marr/ are disregarded for purposes of stress assignment, then they are rejoined to the rest of the word.

6-2 Disyllabic Lexical Words

Disyllabic words in the corpus analyzed for HIA show an almost consistent behavior where first syllables are usually stressed regardless of their weight. First syllables are stressed whether they are heavy or light and the only case where they are not, is when the second syllable is super heavy. The following examples will illustrate:

(22) 1- light-light	/'sa.na/	(year)
	/'wa.ra/	(behind)
2- heavy-light	/'moo.Ta/	(ice cream)
	/'qiT.9a/	(piece)
3- heavy-super heavy	/mef.'taaH/	(key)
	/Ta.'biib/	(doctor)

According to Al-Bay (2001:87), disyllabic words in (22) are metrically dealt with as follows. As for the pattern light-light in (1), "a moraic foot is formed over the pair of light syllables. By trochaic rule, stress is assigned to the first mora" , so the first syllable in /'sa.na/ and /wa.ra/ is the one that carries the stress.

As for the pattern heavy-light in (2), a moraic foot is constructed over the heavy syllable, while the second syllable is light as it is unable to construct a moraic foot by

itself. Following Hayes (1995), the second is considered extrametrical, therefore the first is assigned stress.

The right node in the pattern heavy-super heavy in (3) above is labeled strong only if it is super heavy i.e. if it branches(see Liberman and Prince,1977:268). Hogg and McCully (1987:161) apply End Rule Right which assigns stress to the rightmost element after making the last consonant in the that element extrametrical. At the syllabification level, the last consonant is disregarded to protect final foot from being extrametrical (see Al-Bay,2001:88).

6-3 Trisyllabic Lexical Words

The data analyzed in this paper shows various trisyllabic word patterns which are exemplified below:

(23) 1- light-light-light /'la.za.mo/ (he caught him/it)
2- heavy-light-light /'mad.ra.sa/ (school)
3- heavy-heavy-light /sa9.'doo.na/ (help us)
4- light-heavy-light /da.'rub.na/ (our street)
5- light-light-super heavy /ma.na.'diil/ (hanker chives)
6- heavy-light-super heavy /ban.Ta.'roon/ (trousers)
7- light-super heavy-light /ki.'taab.ti/ (my writing)

The cases where trisyllabic words begin with a light syllable usually have counterparts in which the light syllable is merged to the second after the elision of the vowel of that light syllable. The data analysis indicates that the absence of initial light syllables in trisyllablic words is very clear in the recorded speech of old uneducated Hity citizens, while young educated people realize these light syllables very frequently. Consider the examples below:

Old		**Young**		
1- / bsa.tiin/	**disyllabic**	/ ba.sa.tiin/	**trisyllabic**	orchards
2-/mna.diil/	**disyllabic**	/ma.na.diil/	**trisyllabic**	hanker chives

The patterns (1) and (2) show stress on the first syllable. According to metrical parameters, the second and the third syllables in (1) and (2) are light that is why stress goes back to the first. The moraic foot is formed from left to right, then extrametricality is applied to the final syllable and stress is awarded to the first. The words in (1) and (2) above are metrically diagramed as follows:

(24) /'la.za.mo/ ˘ ˘ ˘ → --- ˘ ˘ /'mad.ra.sa/ →
(x) (x) (x .)
(x .) ----
˘ ˘ < ˘ > ˘ ˘
la za mo mid ra sa

The two words in (24) above are metrically different in two ways. In the first word one moraic foot is possible and the extrametricality is applied to the second syllable,

whereas the second word has two moraic feet and the extrametricality is applied to the last foot.

Patterns (3) and (4) show stress on the penultimate syllable, provided that the final syllable is not super heavy. For pattern (3), stress goes to the penultimate syllable by end rule right, introduced earlier, after moraic feet is constructed from left to right, then extrametricality is applied to the final syllable. Look at the figure below:

(25) /sa9.doo.na/ --- --- ◡

```
 ─────────────────────────►
(              x               )
(x)            (x)

---            ---       <◡>
Sa9            doo        na
```

Pattern (4) is accounted for metrically by considering the last syllable extrametrical, then end rule right is applied and primary stress is awarded to the second syllable. Hayes (1995:95), cited in Al-Bay (2001:95), states that the first syllable in the word below is skipped over by the special rule Priority Clause Principle according to which a light syllable is skipped over if it is followed by a heavy syllable. This rule "is used in languages (like HIA) that enforce strong prohibition on degenerate feet. The figure below will illustrate:

(26) /da.'rub.na/ ◡-- ◡

```
     ─────────────────────►
   (        x          )

  <◡>       x       <◡>
   da      rub       na
```

For the pattern (5) ◡ ◡ --- in the word /ma.na.'diil/, one moraic foot is constructed by the first two light syllables. Another moraic foot is constructed by the super heavy syllable alone. Following Al-Bay (2001:95), the last consonant is marked extrametrical " with the intention to protect the final foot (/diil/) from undergoing extrametricality". Primary stress is assigned to the ultimate syllable via end rule right. The stress generalization presented in (6) above which states that final super heavy syllables constantly attract stress is proved to be right.

Pattern (6) is not that much different from pattern (5) as the final super heavy syllable is also stressed here, the last consonant in the super heavy syllable is marked as extrametrical to prevent foot extrametricality, one moraic foot is constructed on the first heavy syllable, a second moraic foot is constructed on the super heavy syllable alone. The problem is with the second syllable which, being light, can not form a foot by itself. Hayes (1995:308) believes that " when a foot has been constructed, align the window for further parsing by skipping over /◡/, where possible ". The correct stress pattern

will be attained by applying weak parsing and priority clause principle (see Al-Bay, 2001:96). Consider the metrical figure below:

(27) /ban.Ta.roon/ --- ◡ ==

⟶

( )

(x) ◡ (x)

ban. Ta roo<n>

Pattern (7) ◡ == ◡ shows stress on the heavy penultimate syllable provided that the ultimate is not super heavy. To account for the stress pattern in (7) moving from left to right, skip over the first syllable by applying priority clause principle and build a moraic foot over the second heavy syllable, then disregard the ultimate syllable as it is extrametrical. The following metrical grid will illustrate:

(28) /ki.taab.ti/ ◡ == ◡

⟶

(x)

(x)

< ◡ > == < ◡ >

ki taab ti

The stress generalizations presented earlier to assign stress in trisyllabic words in HIA have been sustained by applying various rules like end rule right, priority clause principle besides consonant, syllable and foot extrametricality.

6-4 Quadrisyllabic Lexical Words

Dealing with stress patterns within four-syllabic words in HIA adopting the technique used before is not an easy task as various word patterns will emerge. Following Al-Bay (2001:99-110) who follows Abu-Salim (1981) and Kenstowicz (1981), stress patterns within four-syllabic words are better been accounted for with reference to weight units i.e. moras. Four- syllabic words in HIA may incorporate five to seven moras while in other Arabic variants, like Palestinian, four-syllabic words of four moras are possible. HIA does not show four moras made up with four successive light syllables as it tends to make them three syllables. The word /da.ra.d3a.to/ (his mark) in Palestinian Arabic produces four moras with the pattern ◡ ◡ ◡ ◡ (see Al-Bay,2001:99). The pronunciation HIA speakers realize for the word above is /da.rad3.to/, so it is of three syllables with the pattern ◡ --- ◡ . That would not by any means result in four moras, rather it would result in a pattern of one mora after skipping the first syllable and marking the third extrametrical. The data analyzed in this research show a frequent

tendency towards deleting the vowel of the last syllable and attach its consonant to the preceding syllable when a suffix is added to the root.

Pattern (1) five moras:

a- /mu.'9al.li.ma/ (teacher. female)

According to metrical phonology, the third syllable from the right is the one that attracts primary stress. The algorithm below will illustrate:

```
(29) ------------------------------------------>
   (                   x                )
               x     <(x           .)>

     <˘>         ---      ˘           ˘
      m         9al      li          ma
```

Using priority clause principle, the first syllable is skipped over in favor of the following heavy syllable. The heavy syllable constructs a foot and the third and the fourth construct another foot. Applying foot extrametricality and end right rule, stress is assigned to the antepenultimate syllable.

b- /ka.ra.'wii.ta/ (sofa)

Considering syllables from right to left , the ultimate syllable is light and the penultimate syllable is heavy, so stress in the word above goes to the antepenultimate after applying syllable extrametricality and end rule right. Look at the following:

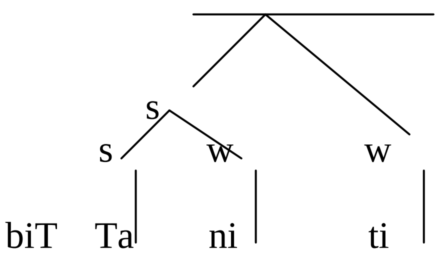
```
(30) -------------------------------->
(                    x      )
 (x         .)      (x)

 ˘          ˘         --   <˘>
 ka         ra       wii   ta
```

c- /biT.'Ta.ni.ti/ (my blanket)

Though stress is usually attracted to heavy syllables, the word above surprisingly does not attract stress to the only heavy syllable in the word /bit/ , rather the second light syllable /Ta/ is the one that receives stress. According to Abu-Salim (1980:91-92), "the last syllable is treated as light….. a maximally ternary left-branching foot is erected at the right edge of the word, with all recessive nodes disallowed to branch." The following grid illustrates:

(31)



Al-Bay (2001:106) presents a better and more sounding explanation in which the two adjacent moraic feet are formulated from left to right, the final syllable is considered extrametrical and primary stress is assigned to the most prominent syllable in the second foot in accordance with end rule right. The algorithm below will illustrate:

(32) ——————————→
(x)
(x) (x .)

--- ˘ ˘ < ˘ >
biT Ta ni ti

Pattern (2) six moras

a- /di.raa.'sit.na/ (our study)

To account for the primary stress assignment in this four-syllabic word, the first syllable is ignored due to primary clause principle as it is followed by a heavy syllable. From left to right, two successive moraic feet are formulated, final syllable is marked extrametrical and stress is awarded to the penultimate in accordance with end rule right. Consider the following:

(33) ——————————→
(x)
x (x) (x)

< ˘ > --- --- < ˘ >
di raa sit na

b- / ki.ta.baat.na/ (our writings)

The second syllable from the right is super heavy, so primary stress falls on it. The penultimate becomes the domain of primary stress, as the final one is made extrametrical. The word in (b) is metrically analyzed as follows:

(34)——————————→
(x)
(x .) (x)

˘ ˘ == < ˘ >
ma na maat na

c- /tis.'ta9.mi.lo/ (to use it)

The pattern above starts with two heavy syllables and ends with two light ones. Starting from left to right, three moraic feet are formulated, the last is marked extrametrical, end rule right is applied and stress falls on the antepenultimate. Al-Bay (2001:108) states that it is the antepenultimate not the first attracts primary stress due to the generalization that primary stress is "the property of the penultimate in the absence of a heavy syllable near the right edge of the word." This pattern is analyzed below:

(35)——————————→
(x)
(x) (x) <(x .) >

--- --- ˘ ˘
tis ta9 mi lo

Pattern (3) seven moras
a- / baT.Ta.ri.'tiin/ (two batteries)

The pattern --- ˘ --- == is accounted for in accordance with the generalization that stress is awarded to the final syllable as far as it is super heavy. Consonant extrametricality is applied to the fourth syllable and then the ultimate syllable is stressed by end rule right.
b- /say.ya.'raat.hum/ (their cars)

The pattern --- ˘ '== ˘ , is accounted for within metrical phonology by marking the ultimate syllable extrametrical and primary stress is awarded to the super heavy penultimate as illustrated below:

(36) ⟶
(x)
(x) (x)

--- ˘ == < ˘ >
Say ya raat na

Through the analysis presented in this paper to account for primary stress assignment in quadric-syllabic words in HIA, it has become evident that primary stress can be attracted by any one of the four syllables: the pre-antepenultimate, the antepenultimate, the penultimate and the ultimate. That is mainly dependent on the number of moras and their sequence as well as adopting rules like extrametricality, end rule right, priority clause principle and weak local parsing.

7- Conclusion

The present study investigated primary stress patterns in an Iraqi variant, namely, HIA. The study showed that metrical phonology is able to account for stress placement in spoken variants as well as standard languages. The study investigated stress placement in lexical words that consist of up to four syllables within a metrical framework. It is evident that the metrical approach is able to predict the location of primary and secondary stress in HIA adopting various rules like end rule right, priority clause principle and weak local parsing in addition to the important role of extrametricality. The stress generalizations presented in this study are totally respected when analyzing lexical words metrically. The conclusions arrived at in this study can be summarized as follows:

1- HIA is a quantity sensitive language that depends greatly on syllable weight to decide stress location. Heavy syllables are assigned two moras in non-final position, while super heavy syllables are assigned two moras whether final or not.

2- Feet in HIA are maximally binary and they are called moraic feet. Degenerate feet are not allowed in HIA.

3- Feet parsing in HIA starts from the left of the word to the right edge and stress counting begins from left to right as well. We begin considering syllable weight from the final syllable until we reach the first.

4- All syllables in the lexical words of HIA have the potential to carry stress, that is why stress placement in HIA is not easy to tackle.

5- Segmental and prosodic extrametricality are both possible in HIA. A consonant might be marked extrametrical to bring up a correct stress pattern. A whole syllable or a whole foot might be marked extrametrical on the prosodic level. Extrametricality is applied to disregard a consonant, a syllable or a foot at the time of assigning primary stress.

6- Final super heavy syllables are stressed after performing last syllable extrametricality. The heavy penultimate syllable is stressed when the final syllable is not super heavy after performing extrametricality is applied to the last syllable. Otherwise The antepenultimate is stressed after foot extrametricality and end right rule are applied.

7- Lexical HIA words of four syllables are better accounted for via dividing them into moras to avoid having very detailed and complicated patterns.

Bibliography

- Abdo, D. 1969. On Stress and Arabic Phonology: A Generative Approach. Khayats, Beirut.
- Abu-Salim, Issam. 1980. "A Reanalysis of Some Aspects of Arabic Phonology: A Metrical Approach". Ph.D. Thesis, University of Illinois, Urbana, Illinois.
- Al Abdely, A. 2002. "Syllable Structure and Syllabification in Heet Iraqi Accent of Arabic and R.P. English". M.A. Thesis, The University of Jordan, Amman.
- Al-Bay, Najwa. 2001. "Some Aspects of a Palestinian Arabic Variant and Standard English Stress Patterns: A Metrical Approach". M.A. Thesis, University of Jordan, Amman.
- Bradley, S. Metrical Phonology and SLA. Bakersfield Convention Center, Bakersfield.
- Bram, Michael.1974. "The Cycle in Phonology: stress in Palestinian, Maltese and Spanish". In Goldsmith, John (editor).Phonological Theory: The Essential Readings. Blackwell, Oxford.
- Bloomfield, L. 1993. Language. Allen and Unwin: London.
- Carr, Philip. 1999. English Phonetics and Phonology: An Introduction. Blackwell, Oxford.
- Chomsky, Noam and Halle, Morris.1968. The Sound Pattern of English. Harper and Row, New York.
- Clements, G. 1994. Non-linear Phonology. In Asher, R. and Simpson, J. (editors), The Encyclopedia of Language and Linguistics. 5:2824-2832.
- Clements, G and Keyser, G. 1983. CV Phonology: A Generative Theory of the Syllable. In: Goldsmith, John(editor), Phonological Theory: The Essential Readings. Blackwell, Oxford.
- Cruttenden, A. 1986. Intonation. Cambridge University Press, London.
- Crystal, D. 1980. A First Dictionary of Linguistics and Phonetics. Western Press Colorado.
- Davenport, Mike and Durham, Hannahs. 1998. Phonetics and Phonology

- Firth, J. 1966. "Sounds and Prosodies". Readings in Linguistics, II, 175-191. University of Chicago Press, Chicago.
- Frawley, William and et al (editors).2003. International Encyclopedia of Linguistics. V.3,Mande Language-Selection. Oxford University Press, Oxford.
- Goldsmith, John. 1990. Autosegmental and Metrical Phonology. Blackwell, Oxford.
- Hayes, Bruce. 1980. A Metrical Theory of Stress Rules. Ph.D. Thesis, M.I.T., Cambridge, USA.
- ---------------. 1989. "Contemporary lengthening in Moraic Phonology". In: Phonological Theory: The Essential Readings. Blackwell, Oxford.
- ----------------, 1995. Metrical Stress Theory: Principles and Cases. The University of Chicago Press. Chicago.
- Hogg, Richard and McCully, C. 1987. Metrical Phonology: A Course Book. Cambridge University Press, Cambridge.
- Johnson, C. 1979. "Opaque Stress in Palestinian". Lingua, 49:153-168.
- Kager, Rene'. 1995. Feet and Metrical Stress. Retrieved on the 15th of March, 2010.
- Khan, D. 1976. Syllable Based Generalizations in English Phonology. Ph.D. Thesis, M.I.T., Bloomington, Indiana.
- Liberman, Mark. 1975. The Intonational System of English. Ph.D. Thesis, M.I.T. Bloomington, Indiana.
- Liberman, Mark and Prince, Alan. 1977. "On Stress and Linguistic Rhythm". Linguistic Inquiry, 8:249-336.
- Michaelmas, 2007. Metrical Phonology. M.St/M.Phil. Phonology \Course. Retrieved on 22nd of May, 2010.
- Oostendorp, Marc. 2005. Stress and Metrical Structure. Retrieved on the 3rd of January, 2010.
- Pearl, Lisa. 2009. "Learning English Metrical Phonology: When Probability Distributions are not Enough". In the proceedings of the 3rd Conference on Generative Approaches to Language Acquisition North America. (editors) Jean Crawford et al.
- Roach, P. 2000. English Phonetics and Phonology. Cambridge University Press, Cambridge.
- Roca, Iggy and Johnson Wyn. 1999. A course in Phonology. Blackwell, Oxford.
- Zec, D. 1995. The role of Moraic Structure in the distribution of segments within Syllables. In: Durand and Katamba (editors) Frontiers of Phonology: Atoms, Structures, Derivations. Longman, London.